Title
Adapted Cognitive Behavioral Therapy for School-Aged Children with Autism Spectrum Disorders and Interfering Anxiety: Impact on Caregiver-Defined Goals

Author
Sklar, Virginia Lynn Hunt

Publication Date
2020

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA

Los Angeles

Adapted Cognitive Behavioral Therapy for School-Aged Children with Autism Spectrum Disorders and Interfering Anxiety: Impact on Caregiver-Defined Goals

A thesis submitted in partial satisfaction

of the requirements for the degree Master of Arts

in Education

by

Virginia Lynn Hunt Sklar

2020

ABSTRACT OF THE THESIS

Adapted Cognitive Behavioral Therapy for School-Aged Children with Autism Spectrum Disorders and Interfering Anxiety: Impact on Caregiver-Defined Goals

by

Virginia Lynn Hunt Sklar

Master of Arts in Education

University of California, Los Angeles, 2020

Professor Jeffrey J. Wood, Chair

Central challenges for children with autism spectrum disorder (ASD) can include difficulties with social communication, symptoms of emotional dysregulation, and pervasive effects of rigid and repetitive behaviors (Cuccaro et al., 2003; Matson & Nebel-Schwalm, 2007; Samson et al., 2014). Further, the heterogeneous phenotypes of individuals with ASD are often typified by additional forms of psychopathology. Nearly 40% of children with ASD are estimated to present with clinically elevated levels of anxiety (Van Steensel et al., 2011). Psychotherapy is a commonly used treatment for school-aged children with ASD and co-occurring anxiety. This secondary data analysis of a multisite randomized clinical trial (Wood et al., 2019) compared two variants of cognitive behavioral therapy (CBT) to explore the most

efficacious treatment for addressing specific caregiver-defined goals. In this study, adapted CBT (BIACA; Wood et al., 2009) and standard-of-practice CBT (Coping Cat; Kendall & Hedtke, 2006) were compared: (1) to better understand the varying types of clinical needs that children with ASD and anxiety present with, and (2) to investigate which CBT approach is best suited to support these varying clinical needs. In this study's subsample, children with ASD and clinical levels of anxiety (N=148; aged 7-13 years, M_{age}=9.90, SD=1.78) were randomly assigned to a treatment condition (BIACA or Coping Cat). Both treatments provided 16 therapy sessions. BIACA personalized treatment through the utilization of a modular design which apportioned evidence-based treatment elements based on each child's clinical need. Coping Cat provided CBT in a prescriptive format regardless of child's overall clinical presentation. The primary outcome measure was parent severity ratings on caregiver-defined goals throughout treatment (Youth Top Problems; Weisz et al., 2011). BIACA outperformed Coping Cat on the primary outcome measure (p=.005). The findings from this study can inform clinicians about the benefits of personalized treatment plans as well as which caregiver-defined goals are better served by the modular/personalized format of adapted CBT. Further research should explore the feasibility of implementation by clinicians in varying contexts.

The thesis of Virginia Lynn Hunt Sklar is approved.

Jennie Katherine Grammer

Connie L. Kasari

Jeffrey J. Wood, Committee Chair

University of California, Los Angeles

2020

TABLE OF CONTENTS

List of Figures

List of Tables

Adapted Cognitive Behavioral Therapy for School-Aged Children with Autism Spectrum Disorders and Interfering Anxiety: Impact on Caregiver-Defined Goals

For children with autism spectrum disorder (ASD), central challenges can include difficulties with peer interaction, struggles with social communication, challenges of emotional dysregulation, as well as pervasive effects of rigid and repetitive behaviors (Cuccaro et al., 2003; Matson & Nebel-Schwalm, 2007; Samson et al., 2014). The most recent reports show that 1 in 59 children have ASD, a steady increase of diagnoses occurring over the past 10 years (Baio et al., 2018). Moreover, research has shown that of children with ASD, nearly 40% were estimated to present with clinically elevated levels of anxiety or at least one anxiety disorder (Van Steensel et al., 2011). The varied and heterogeneous phenotypes of individuals with ASD are often typified by additional forms of psychopathology. For example, as children with ASD move through the school system, psychiatric comorbidities (e.g., anxiety) also appear to increase in frequency in comparison with their typically developing peers: 5.6% of ages 4–6 years, 48.4% of ages 7–10 years, and 46.0% of ages 11–17 years are diagnosed with comorbid anxiety disorder (Bauminger-Zviely, 2014). Many school-aged children with ASD presenting with interfering anxiety also present with other emotional and behavioral challenges (White et al., 2014). Thus, there is a vast range of presenting symptoms for individual school-aged children with both ASD and significant rates of anxiety. Despite this complexity, with the increased frequency in which school-aged children with ASD struggle with interfering anxiety, emotional dysregulation, and behavioral challenges, there is a call for interventions that better understand this heterogeneity while also targeting improvement of these competencies for productive change over time.

In affecting the potential challenges that school-aged children with ASD may experience, psychological therapy (i.e., psychotherapy) is a commonly used mental health service, with 23%

to 43% of the ASD population indicating utilization of this treatment type (Stuart et al., 2017; Zablotsky et al., 2015). A number of small randomized clinical trials have investigated the potential benefits of a specific form of psychotherapy, cognitive behavioral therapy (CBT), for school-aged children with ASD and interfering anxiety, with varying rates of success at reducing both anxiety and ASD symptomology (Reaven et al., 2012; Storch et al., 2013; Stoch et al., 2015; Wood et al., 2009; Wood et al., 2015). Among these studies there are generally two types of CBT programs that have been evaluated: (1) prescriptive, invariant programs that provide the same intervention to children with ASD and interfering anxiety regardless of overall clinical presentation (i.e., Standard-of-Practice CBT; e.g., Coping Cat, Kendall & Hedtke, 2006), and (2) personalized, modular programs that provide an adjusted intervention to children with ASD and interfering anxiety with modifications guided by each child's clinical needs (i.e. Adapted CBT; e.g., BIACA, Wood et al., 2009). There has been one large study comparing both standard-of-practice CBT and adapted CBT (e.g. Wood et al., 2019) showcasing that CBT is an efficacious treatment for school-aged children with ASD and maladaptive and interfering anxiety, with an adapted CBT approach exhibiting additional advantages on standardized outcome measures. However, it is still unclear whether treatment focusing on reducing anxiety symptoms are in line with the challenges that parents see as the child's top need for support. Moreover, if many parents of children with ASD and interfering anxiety do not view anxiety symptoms as the top support need, it is ambiguous how effective CBT is at addressing the varying emotional and behavioral challenges that are seen as the top treatment priority for parents of a child with ASD and co-occuring anxiety.

Although many of these randomized clinical trials have shown reductions in maladaptive and interfering anxiety and ASD symptomology, the heterogeneity and variability of symptom

presentation of children with autism suggests the need for individualized supports and services for children and their families (Weisz et al., 2011; Wood et al., *under review*). Thus, the purpose of this study was twofold: (1) to better understand the varying clinical needs that children with ASD and anxiety present with as a result of the heterogeneous phenotypes in ASD, which are often typified by additional forms of psychopathology, and (2) to understand which CBT approach is best suited to supporting these varying clinical needs. The present study first attempted to better understand and categorize the various goals parents have for their child's treatment (i.e., caregiver-defined goals). Then, upon considering different types of caregiver-defined goals, this study evaluated the relative efficacy of two CBT programs in reducing caregiver-defined target areas of autism and interfering anxiety symptomatology (Wood et al., 2019) using the Youth Top Problems rating scale (YTP; Weisz et al., 2011) of parent-reported problems.

Literature Review

First, literature examining cognitive behavioral therapy as an efficacious treatment for reducing maladaptive anxiety symptoms as well as core ASD symptoms for school-aged children with ASD and anxiety is presented. Then, the role of a personalized treatment approach for school-aged children with ASD and co-occurring anxiety is explored.

Autism Spectrum Disorder & Interfering, Maladaptive Anxiety

ASD is a developmental disorder associated with communication difficulties as well as restricted interests and repetitive behaviors (Diagnostic and Statistical Manual- Fifth Edition, DSM-5, American Psychological Association, 2013). Recent reports show that about 1 in 59 children have been identified with ASD, and ASD is about 4 times more common among boys

than among girls (Centers for Disease Control and Prevention, 2018). In addition to the presence of social, emotional, and behavioral challenges that can impede children with ASD, those with ASD also display increased rates of co-occurring symptoms of anxiety (Samson et al., 2014; Wood & Gadow, 2010).

The increased presence of anxiety within the context of ASD has been known for almost a century. High levels of generalized worry and fear of specific situations have been noted since the first clinical descriptions of autism (Kanner, 1943). Furthermore, through the evolutions of descriptive tenets of ASD in the Diagnostic and Statistical Manual- Fifth Edition (DSM-5), as well as burgeoning research on treatments investigating the intertwined role of anxiety in the presentation of children with ASD, the diagnostic criteria for ASD seem to overlap with the diagnostic criteria of clinically significant levels of anxiety. Research has shown that about 40-50% of children with ASD present with anxiety disorders (Van Steensel et al., 2011). Children with both ASD and anxiety symptomatology seem to experience elevated levels of distress above and beyond impairments as a result of ASD alone (Bellini, 2004; Chang, Quan, & Wood, 2012). Furthermore, anxiety is distinguishable from core ASD deficits; however, anxiety is also influenced by core ASD deficits (Kerns & Kendall, 2012; Kerns et al., 2017).

This increased presence of anxiety symptomatology can provide additional challenges for school-aged children with ASD due to potential functional impairment above and beyond the presence of ASD (White et al., 2014). For example, school-aged children with both ASD and anxiety often exhibit traditional childhood fears (e.g. separation anxiety, generalized anxiety) as well as atypical fears and anxieties (e.g. specific sounds, minor changes in routine, germs, mealtime rituals; Kerns et al., 2014). With amplified rates of atypical fears and anxieties in conjunction with ASD symptoms, these children often have greater difficulties with adaptive

functioning, social skills, loneliness, potential exhibition of self-injurious behaviors, family conflict, and behavioral challenges that manifest in varying contexts (e.g., with peers, in academic settings). These challenges can interfere with academic success and overall functioning (Storch et al., 2012; Kaat, Gadow & Lecavalier, 2013; Swan & Kendall, 2016). Thus, higher rates of child anxiety are associated with greater difficulties in youth with ASD. Moreover, due to the heterogeneous nature of ASD, there is much variability in the manifestation and presentation of symptoms of autism and anxiety, creating a large range of treatment goals for this population (Keen, Webster & Ridley, 2016).

Cognitive Behavioral Therapy for Anxiety in School-Aged Children with ASD

Due to the increased presence of anxiety symptoms in children with ASD, there is a heightened need for efficacious interventions to target these symptoms. Studies of youth with ASD have shown that psychotherapy is a commonly used mental health service (Zablotsky et al., 2015). For decades, a specific form of psychotherapy, cognitive behavioral therapy (CBT), has been used to target anxiety in typically developing children and adults (Cartwright-Hatton et al., 2004). Building upon these findings, several CBT programs adapted for the characteristics specific in ASD have also been investigated (Reaven et al., 2012; Storch et al., 2013; Stoch et al., 2015; Wood et al., 2009; Wood et al., 2015).

CBT Theoretical Framework: Information Processing Theory. CBT has been successful at modifying potentially problematic behaviors and ways of thinking, and it is now a favored therapy for a wide variety of conditions, including anxiety (Cartwright-Hatton et al., 2004). The foundation of CBT rests in information processing theory, which postulates that at any one time we have multiple memories, both positive and negative, competing to be retrieved (Brewin, 2006). Typically, in a psychiatric disorder like anxiety, negative representations are

highly accessible and salient; intrusive memories, negative and self-depreciating interpretations, and ruminative thoughts are often dominant. The goal of CBT is not to directly modify negative information in memories or ruminating thoughts. Rather, CBT aids in the selection of and the creation of alternative representations to restore a more positive mood state, bringing about the desired change for participants (Brewin, 2006).

Standard-of-Practice CBT. Many CBT programs have been developed for typically developing youth with anxiety, with Coping Cat Cognitive-Behavioral Therapy for Anxious Youth (Kendall & Hedtke, 2006) being a commonly used behavioral treatment protocol. Coping Cat (CC) has shown to be effective in the maintenance of treatment gains over time for typically developing youth from 7 to 13 years of age (Kendall & Southam-Gerow, 1996; Kendall et al., 1997; Kendall et al., 2008; Swan et al., 2018). In this specific standard-of-practice, or prescriptive, CBT program of CC, participants receive 16 weekly 60-minute sessions where the main treatment features include: (1) recognizing anxious feelings and somatic reactions to anxiety, (2) identifying cognition in anxiety provoking situations (e.g. expectations of threat), (3) developing a plan to cope (e.g. cognitive reappraisal), (4) engaging in imaginal and in vivo exposure tasks, and (5) utilizing self-reinforcement for effort (Wood et al., 2019). Further, the CC program includes modeling, role-play, affective education, contingent reinforcement and reward systems, problem solving skills, and exposure tasks, while also involving parents in the child's treatment through a 15-minute check-in at the start of each session and two subsequent meetings with the therapist.

This format of CBT has also been tested in treating school-aged children with ASD (McNally-Keehn et al., 2013; Van Steensel & Bögels, 2015). These studies have shown that a standard-of-practice/prescriptive variant of CBT like CC is a promising treatment option for

treating anxiety in youth with ASD. However, knowledge on the efficacy of standard-of-practice CBT in reducing anxiety in youth with ASD is limited as a result of small sample sizes (Hunsche & Kerns, 2019).

Adapted CBT. Several CBT programs have been adapted to target characteristics of ASD (e.g. social communication symptoms, dysregulated behavior, inflexibility/repetitive behaviors). An adapted CBT approach provides a range of benefits to the child and family. Due to the modular format of adapted CBT, components of treatment can be apportioned based on need giving an opportunity for a personalized treatment program for supporting the reduction of a child's anxiety and ASD symptoms. An example of an adapted CBT treatment approach is Behavioral Interventions for Anxiety in Children with Autism (BIACA; Wood et al., 2009; Wood et al., 2015).

In comparison to the standard-of-practice version of CC previously outlined, the adapted CBT treatment program BIACA has longer session times (i.e. 90 minutes instead of 60 minutes), allowing treatment to be tailored to the unique needs of a child with both ASD and anxiety (e.g. social communication skills, restrictive/repetitive interests). Moreover, the added time allows for greater parent contribution, since a child with ASD may benefit from increased parental involvement in psychotherapy treatment than is characteristic of a standard-of-practice CBT approach (Puleo & Kendall, 2011; Wood et al., 2019). An adapted CBT program, such as BIACA, broadens the focus of an invariant, prescriptive standard-of-practice CBT program such as CC, making it more responsive to the needs of the individual receiving treatment.

Standard-of-Practice CBT versus Adapted CBT. Several studies have been conducted examining the effect of CBT on the symptoms of anxiety in children both with and without ASD, and many of these studies have found promising results (Van Steensel et al., 2011; Reaven et al.

2012; Wood et al., 2009; Wood et al., 2015). For example, when examining the effectiveness of CBT specifically adapted for the treatment of anxiety disorders in ASD (i.e., BIACA), a substantial percentage of children were found to be free from all anxiety disorders at post-treatment (i.e., 53%; Wood et al., 2009), as well as shown an overall decrease in anxiety levels (e.g., Chalfant et al., 2007; Reaven et al., 2012). CBT also seems to be a cost-effective alternative when comparing it to other treatment options for anxiety (e.g., medication) in the ASD population (Van Steensel & Bögels, 2015; Storch et al., 2015).

However, until recently, it was unknown whether adapted CBT differed from standard-of-practice CBT in its effects on standardized outcome measures for youth with ASD and co-occurring anxiety. There has been one large study that has compared a version of standard-of-practice CBT (e.g., Coping Cat) to adapted CBT (e.g., BIACA; Wood et al., 2019). In this study, CBT appears to be an efficacious treatment for school-aged children with ASD and maladaptive and interfering anxiety, with an adapted CBT approach showing additional advantages. Thus, this study's main outcome paper showed that CBT was efficacious at improving standardized outcome measures in children with ASD and interfering anxiety when prioritizing the reduction of anxiety symptoms. Yet, what was still unknown was how effective CBT was at addressing the individualized challenges unrelated to anxiety that may be seen as the top treatment priority by parents for their child with ASD and co-occurring anxiety.

Personalized Outcome Assessment

Despite promising results suggesting CBT plays a role in reducing both ASD symptoms and anxiety symptoms over time for youth with ASD and anxiety, there is still great difficulty in understanding treatment effects due to underpowered studies that are not sensitive to differences throughout the course of treatment (Kanne et al., 2014). In conjunction with standardized

measures not being sensitive to change over time, personalization of care throughout the course of treatment is central in supporting various youth with developmental and psychological disorders (Weisz et al., 2012). Noting the importance of individualized treatment, the Youth Top Problems (YTP) approach was created to personalize treatment outcomes while also being a simple yet robust methodology for measuring the decrease of symptom severity over time (Weisz et al., 2011; 2012).

At pretreatment, parents described their child's top three autism and anxiety related problems (YTPs) in their own words and rated the severity of these problems on a Likert-type scale. The specific problems were transcribed in the parents' own words, and they provided an Initial Symptom Severity Rating on a scale of 0 *(not at all)* to 10 *(very, very much)* for each symptom/problem. Parents made weekly severity ratings on the child's top three YTPs for the 16 weeks of treatment (Wood et al., 2019). The YTP Symptom Coding System (Wood et al., *under review*), a pre-established approach used to code these YTP symptoms into categories applicable to youth with ASD and co-occurring anxiety, is then used to better understand a child's individual presentation of ASD psychopathology and emotional dysregulation.

The use of the YTP (Weisz et al., 2011) is sensitive to capturing change over the course of treatment while also being a different lens than nomothetic measures like the Pediatric Anxiety Rating Scale and Child Behavior Checklist (Wood et al., 2019). The YTP as an outcome measure is idiopathic and personalized to each caregivers' goals, likely capitalizing on the heterogeneity that is part and parcel to an autism diagnosis and increasing the meaningfulness to the respondent. Through utilizing the YTP as an outcome measure, there are opportunities to address specific, caregiver-defined goals instead of generic, researcher-defined goals throughout the course of treatment.

Even when participating in a treatment characterized as "anxiety focused," the heterogeneity of problems and goals caregivers hope to prioritize in treatment may be vast. The picture of children with ASD and concurrent interfering anxiety is complex, and previous studies have mainly focused on standardized, researcher-defined anxiety related outcomes instead of caregiver-defined goals (Wood et al., 2019). It is unclear from the standpoint of the family if their most pressing treatment priorities are even being addressed in interventions designed for children with ASD and interfering, maladaptive anxiety. It is also unclear if anxiety is even the category of problem many families hoped to see as the focus of treatment. Further, it is uncertain whether a personalized intervention like adapted CBT better addressed these personalized goals.

Current Study

The purpose of this secondary data analysis of an experimental design was to categorize the range of caregiver-defined goals for therapy derived from a sample of parents/caregivers of children with both ASD and concurrent anxiety. Moreover, this study utilized secondary data analysis of a multisite randomized clinical trial to explore if adapted cognitive behavioral therapy is the most efficacious treatment for addressing specific caregiver-defined challenges in children with ASD and maladaptive and interfering anxiety. Through descriptive analysis and linear mixed modelling, this study investigated which caregiver-defined challenges adapted CBT was most and least efficacious at addressing, in order to better address personalized treatment needs and goals of school-aged children with ASD and anxiety.

Research Questions and Hypotheses

The current study questions included:

Research Question 1: What are the types of caregiver-defined goals that caregivers hope to address throughout the course of treatment?

Hypothesis 1*:* Through categorization and descriptive analysis, there will be a large range of caregiver-defined goals that caregivers will bring to treatment, mirroring the heterogeneous picture of a child with ASD and interfering, maladaptive anxiety. However, there will likely be broad categories that reflect core ASD symptoms including social-communication symptoms, restricted/repetitive behaviors, externalizing symptoms, and internalizing/anxiety symptoms.

Research Question 2: Which treatment (e.g. Adapted CBT or Standard-of-Practice CBT) promotes the greatest change over time on caregiver-defined goals?

Hypothesis 2*:* Understanding which treatment promotes the greatest change over time on caregiver defined YTPs is the primary outcome analysis of interest in this study. By utilizing linear mixed models (LMMs), adapted CBT will significantly outperform standard-of-practice CBT on caregiver-defined challenges over the course of treatment via a reduction in personalized symptoms ratings of YTP total scores. This is due to the modular format of adapted CBT that allows for increased personalization of objectives throughout the course of treatment.

Research Question 3: Will there be differential treatment effects (e.g. Adapted CBT or Standard-of-Practice CBT) on the symptom reduction of specific clinical domains (e.g. social-communication symptoms, restricted/repetitive behaviors, externalizing symptoms, internalizing/anxiety symptoms)?

Hypothesis 3**:** For secondary outcome analysis, LMMs will be used to investigate differential treatment effects on symptom reduction. In both CBT formats, the greatest symptom reduction is expected to occur in internalizing symptoms with an added benefit of adapted CBT

(Wood et al., 2019), as anxiety-reduction is a core focus of CBT. However, adapted CBT is also designed to target possible maladaptive repercussions of emotional dysregulation early in treatment for children with ASD. Thus, when adapted CBT is compared with standard-of-practice CBT on specific clinical domains, adapted CBT will show greater subsequent reduction in the core ASD symptoms of social-communication symptoms, restricted/repetitive behavior, and externalizing symptoms.

Method

Participants

This secondary data analysis used a previous multisite randomized clinical trial (RCT; Wood et al., 2019) conducted at a large metropolitan research institution from April 2014 to January 2017. The Wood et al. (2019) study evaluated the efficacy of two versions of Cognitive Behavioral Therapy (CBT) and treatment as usual (TAU) in the form of adapted CBT and standard-of-practice CBT for anxiety in youth with ASD to assess the impact on standardized measures of anxiety symptomatology and core ASD symptom severity, whereas the primary objective of this study was to evaluate the impact of CBT on personalized, caregiver-defined goals. In the primary RCT, of 214 children initially enrolled, 206 children were screened, 167 were randomized, 145 completed treatment, and 22 discontinued (for details see Wood et al., 2019). If a child was initially enrolled but failed to meet eligibility criteria (i.e. no confirmed ASD diagnosis) they were not randomized to treatment conditions. There was no significant difference in discontinuation across the adapted CBT, standard-of-practice CBT, and treatment as usual conditions. Since TAU is not a specific treatment, it was not included in the present study and it will not be considered further.

Of the randomized sample, participants ranged in age from 7-13 years (*M*=9.90, *SD*=1.78). Three universities in major U.S. metropolitan areas served as data collection sites (*N*=64, 61, and 42). Participants were recruited via letters/emails, flyers, and clinician referrals. Of the 167 children who were randomized, 71 were randomized to the standard-of-practice CBT treatment and 77 were randomized to the adapted CBT treatment. Overall, in the treatment conditions of interest, 23.13% of children were female, 18.49% were reported by their parents to be Latina/o/x, and 19.58% had a total household income < $40,000. Relevant demographic data for treatment conditions of interest are depicted in Table 1. Pretreatment sample demographic and clinical characteristics (Table 1) showed no significant condition differences.

Several significant study site differences in pretreatment characteristics were identified (see Wood et al., 2019). For this secondary data analysis, study site was treated as a fixed effect in subsequent LMMs as the 16 session timepoints were nested within children, and there was a random intercept included in all models. Site differences for relevant primary and secondary outcome analyses are later reported. No pretreatment differences for YTP category ($p > .062$) was found for site or condition. However, a significant condition effect was found for pretreatment YTP severity (F (1, 2.20) = 26.29, p = .029) such that children in the standard-of-practice CBT condition (M= 6.55, SD= 2.16), had higher parent ratings of symptom severity than children in the adapted CBT condition (M= 6.08, SD= 2.28).

Specific eligibility criteria for this study also included; (a) meeting criteria for a clinical diagnosis of ASD confirmed by two independent evaluators using the Childhood Autism Rating Scale Second Edition, High Functioning Version (CARS-2HF) and the Autism Diagnostic Observation Schedule-2 (ADOS-2) via algorithm scores, (b) an IQ ≥ 70 as assessed using the Wechsler Intelligence Scale for Children-IV (WISC-IV) with estimated full-scale IQ based on

the Vocabulary and Matrix Reasoning subscales (*IQ range*= 68-146, *M*=102.25, *SD*=14.96), (c) maladaptive and interfering anxiety levels as assessed via the Pediatric Anxiety Rating Scale where a total score ≥ 14 corresponds with maladaptive and interfering anxiety, and (d) not be receiving interventions that required an extensive time commitment (>2 hours/week) or already receiving interventions that target anxiety with psychotherapy. These criteria were established to promote internal validity in the study's sample, facilitate access by participants for all intervention components, and to ensure that all participants could fully experience the benefits of the randomized intervention in order to show meaningful change over time.

Procedures

Procedures were approved by the Institutional Review Boards at all three sites and informed consent by parents and assent by youth were provided. After participants were screened and eligibility was determined, each participant was randomized to receive either adapted CBT (e.g., BIACA), standard-of-practice CBT (e.g., Coping Cat), or treatment-as-usual (TAU) as determined via a computer-generated algorithm with a 4.5:4.5:1 ratio (for details see Wood et al., 2019). TAU was not evaluated in this study as it was not a specific treatment. The YTP assessment was initially administered after the ADIS at Screening and parents stated the symptoms/problems which were the most concerning to them. Parents also made weekly severity ratings on the child's top three identified YTPs for the 16 weeks of treatment.

Coping Cat (CC). Participants randomly assigned to this particular invariant, prescriptive standard-of-practice CBT program received 16 weekly 60-minute sessions of the CC program, found to be effective in trials of typically developing youth aged 7-13 years (Kendall et al., 2008; Swan et al., 2018). The treatment uses modeling, role-play, and contingent reinforcement. Specific homework tasks are assigned. Parent involvement in the child's

treatment includes a regular 15-minute check-in at the start of each session and two meetings with the therapist.

Behavioral Interventions for Anxiety in Children with Autism (BIACA). In this specific modular, personalized adapted CBT program (Wood et al., 2009, 2015), BIACA uses CBT strategies such as reappraisal and exposure. However, BIACA differs from CC in the following ways: (a) 16 weekly 90-minute sessions (split evenly between children and parents) to facilitate parent engagement, (b) a modular format guided by an algorithm to personalize treatment because of the heterogeneous presentation of ASD anxiety across all participants, (c) disruptive behavior is addressed with incentive-based practices, (d) inclusion of modules on social engagement skills, (e) special interests are incorporated into treatment to facilitate greater child engagement.

Measures

Youth Top Problems (YTP). The YTP approach is a valid and reliable personalized assessment method sensitive to treatment response in children (Weisz et al., 2011). As part of the pretreatment screening process, parents described their child's top three autism and anxiety related problems (YTPs) in their own words and rated the severity of these problems on a Likert-type scale. The specific problems were transcribed in the parents' own words, and they provided an Initial Symptom Severity Rating on a scale of 0 *(not at all)* to 10 *(very, very much)* for each symptom/problem. Before randomization, 206 school-aged children who were interested in participating and presumptively exhibited ASD and clinical anxiety diagnoses based on parent supposition provided the Initial YTP Symptom Severity Ratings. This generated an initial set of 620 separate Initial YTP Symptom Severity Ratings which were considered at the descriptive level of analysis. Upon randomization of those who met clinical treatment eligibility, of the 71

families in standard-of-practice CBT treatment condition and the 77 families in the adapted CBT treatment condition, the three highest rated problems were transcribed in the parents' own words. Parents made weekly severity ratings on the child's top three YTPs for the 16 weeks of treatment generating the Weekly YTP Ratings During Treatment. Each of the caregiver-defined goals (i.e. Initial YTP Symptom Severity Ratings and Weekly YTP Ratings During Treatment) were coded into 1 of 43 symptom categories (i.e., YTP Symptom Coding System; see Wood et al., *under review*) developed for use with the YTP and reflective of the four broader clinical areas for school-aged children with ASD and maladaptive anxiety: (a) 20 entail social-communication (SC) symptoms, (b) 7 relate to restricted/repetitive behavior (RRB) symptoms, (c) 12 capture externalizing symptoms, (d) 4 include internalizing symptoms (Wood et al., *under review*).

Under the SC symptom category, an example of a specific code is "1300: lack of friends (including being excluded)." Examples of specific YTPs in the parents' own words that would be mapped onto this code include: "Lacks social skills, is isolated, and doesn't have friends", "Struggles making friends and sustaining friendships", and "Difficulty retaining friendships due to difficulty understanding social cues." Many of these parent-generated YTPs not only point to a child's lack of friendships as central to this specific code, but also illuminates the potential of larger social-communication and conversation challenges that should be focused on during the course of treatment.

Within the RRB symptom category, an example of a specific code is "2200: inflexibility - nonsocial (e.g., resists non-preferred activities, daily routines, expectations, transitions, new things, can be with anger/negative affect)" where sample parent-generated YTPs mapped to this code include: "Not flexible with schedule, time and routine activities", "Lack of willingness to try new things", "Disobeys and yells when asked to make a change", and "Will not ask teacher

for assistance or clarification even if needed." These caregiver-defined problems provide examples of inflexibility in addition to varying contextual details where RRB symptoms are a likely hinderance to a child's overall functioning.

Further, examples of YTPs that fall under the broader clinical domain of externalizing symptoms and were mapped onto the specific code "3400: easily angry/frustrated (e.g., with family, difficult tasks, blocked goals, sense of unfairness)" include: "Negative interactions with peers due to acting out when anxious", "Shows extreme negativity related to school including negative verbalizations and avoidance", "Temper tantrums after setting limits on preferred activities", "Becomes angry and oppositional when asked to complete homework", "Unable to effectively use coping skills without getting angry", and "An inability to accept constructive feedback without completely melting down." These parent generated YTPs specify details about a child's anger or frustration (e.g. during peer interactions, regarding school activities like homework) that would be problematic for a child's overall functioning and may not be captured in traditional measures of externalizing symptomology.

Finally, an example of a category of a caregiver-defined problem coded under internalizing symptoms includes "4000: non-social, general anxiety (e.g., germs, math, worry, movies, new places)." Caregiver-defined YTPs that would be mapped to this code include examples such as: "Unable to go outside due to worries about bees and wasps", "Worries about being late for school so carries around backpack", "Fear of failure and disappointing others", and "Asking for frequent reassurance including about germs, self-doubt, and decisions." Of the array of caregiver-defined problems that parents hope to address throughout the course of treatment, the YTP symptoms and ratings specify details that would unlikely be captured by standardized assessment methods illustrating the YTPs capacity for the personalization of treatment.

Rater training and reliability. Rater training on categorizing individual YTP symptoms into the 43-category YTP Symptom Coding System was conducted at the onset of analysis. The primary rater was trained to k>.7 criteria against consensus gold standard coding. A second independent rater, unaware of the original codes mapped to the parent generated YTPs, independently mapped codes for randomly selected cases. For categorizing individual YTP symptoms into the 43-category YTP Symptom Coding System, rater concurrence was in the fair to good range (*n*= 62 [out of 620; 10%], k=.63). However, for the four specific clinical domains (e.g. social-communication symptoms, restricted/repetitive behavior, externalizing symptoms, internalizing/anxiety symptoms) central to hypothesis testing, rater concurrence was in the excellent range (*n*= 62 [out of 620; 10%], k=.76; Fleiss, 1981).

Results

Frequencies of Caregiver-Defined YTP Symptoms

Addressing the first research question, descriptive statistics of categorization of caregiver-defined goals for treatment via 43-category YTP Symptom Coding System are presented in Table 2. Of all of the 620 initial YTP symptoms generated by parents, 189 (30.5%) were externalizing symptoms, 186 (30.0%) were internalizing symptoms, 128 (20.7%) were social-communication (SC) symptoms, and 117 (18.9%) were restricted/repetitive behavior (RRB) symptoms, based upon primary rater coding with the YTP Symptom Coding System (Table 2).

In considering the 43 categories of the YTP Symptom Coding System (Table 2), the most frequently used categories for coding the 620 separate Initial YTP Symptom Severity Ratings in externalizing symptoms was “Easily angered or frustrated (e.g. with family, difficult tasks,

blocked goals, sense of unfairness)" (n=78, 41.3%) and "Non-compliance and often with anger" (n=50, 26.5%). For internalizing symptoms, the most frequently cited category included "Non-social, general anxiety (e.g. germs, math, worry, movies, new places, making decisions)" (n=94, 50.5%). The caregiver-defined YTP for SC symptoms most frequently noted were "Lack of flexibility regarding peer socialization (e.g. around non-preferred activities, bossiness, can be with anger)" (n=21, 16.4%), "Lack of friends including being excluded" (n=17, 13.3%), and both "Poor social initiation or greetings" (n=15, 11.7%) and "Failure to keep conversations going or share own experiences" (n=13, 10.2%) under possible poor social skills and language challenges. Finally, in RRB symptoms, "Inflexibility – nonsocial (e.g. resists non-preferred activities, daily routines, expectations, transitions, new things, can be shown with anger and negative affect)" (n=78, 66.7%) was the most coded category.

Upon grouping if any of a child's top three YTPs were coded into the four overarching symptom types, 102 (49.5%) were SC symptoms, 63 (30.6%) were restricted/repetitive behavior, 99 (48.1%) were externalizing symptoms, and 130 (63.1%) were internalizing/anxiety symptoms). Frequency of pre-treatment/initial YTP Symptom Severity Ratings are grouped by clinical domain and presented in Figure 1 showcasing how many of a child's three YTPs fell into each symptom category. Figure 1 displays that most child's YTPs are categorized across multiple symptoms of the four core clinical domains. Moreover, pre-treatment/initial YTP Symptom Severity ratings for the four clinical domains are depicted in Figure 2. Of a child's top three YTPs, most are rated with high severity on a scale of 0 (*not at all*) to 10 (*very, very much*). Both presented figures suggest the breadth of caregiver-defined goals and the range of symptom severity ratings that caregivers hoped to address throughout the course of treatment. Thus,

descriptive analyses of the Initial YTP Symptom Severity Ratings capture the heterogeneous picture of a child with ASD and interfering, maladaptive anxiety.

Primary Outcome Analysis

The goal of the primary outcome analysis of the second research question was to test the comparative treatment effects of Coping Cat (CC) and Behavioral Interventions for Anxiety in Children with Autism (BIACA) on caregiver-defined YTP symptoms and severity ratings using linear mixed models (LMMs). LMMs provide benefits for analyzing data where differing levels of variance need to be simultaneously measured (Raudenbush & Bryk, 2002). For this study, repeated measures were taken over time and the research questions had two foci: child and time of session during the course of treatment. In the LMMs, 16 session time points were nested within children, and there were random intercepts included in all models. In order to better understand the varying treatment effects of the two conditions of interest (e.g., CC or BIACA) on caregiver-defined goals, treatment effects were represented by the change in caregiver-defined goals and symptom severity ratings (i.e., Weekly YTP Ratings During Treatment) over the 16-weeks of treatment.

LMMs identified differences in treatment outcome trajectories for the two types of CBT on a child's mean YTP scores (generating a slope for each child in the model). LMM-based estimated differences between treatment conditions are presented in Table 3. Table 3 depicts the overall LMM model which includes all relevant two-way interactions (i.e., treatment condition by session time, treatment condition by site, and site by session time) as well as the three-way interaction of interest (i.e., treatment condition by session time by site). The primary parameter of relevance in the overall LMM model (Table 3) is the interaction between treatment condition and session time since this reflects both a child's randomized exposure to type of treatment

condition (e.g., CC or BIACA) as well as time of session throughout the course of treatment. There was a statistically significant effect (*p*=.049*)* for the treatment condition by session time interaction showing that mean YTP symptom severity ratings decreased more in the BIACA condition than in the Coping Cat condition over the course of 16 sessions.

When adding the fixed effect of site for the three-way interaction of treatment condition, session time, and site, there does not appear to be a significant effect on a child's mean YTP symptom severity ratings (*p*=.056). Although the three-way interaction is not significant, this value is nearly significant, so exploration into site differences may still be interesting to investigate. Table 5 depicts the estimated marginal means (EMMs) by site of predicted mean YTP ratings during treatment for BIACA and CC from Session to 1 to Session 16 exploring the nearly significant three-way interaction. Further, change in EMMs of predicted mean weekly YTP ratings during treatment for BIACA and CC from Session 1 to Session 16 across all three sites are shown in Figure 3.

Refocusing on the goal of the primary outcome analysis, there was a significant difference for the interaction between treatment type and time of session on mean YTP symptom severity ratings. A parsimonious model removing nonsignificant effects of site from the model and thus modeling treatment condition by session time across sites shows there is a significant difference (*p*=.005) between treatment type and session time on mean YTP scores. By the end of treatment (e.g. Session 16), BIACA (*EMM*= 4.60, *SE*= .20) significantly outperformed CC (*EMM*= 5.21, *SE*= .21) in the reduction of a child's mean YTP symptom severity ratings.

Secondary Outcome Analysis

The secondary analyses explored if there were differential treatment effects on the symptom reduction of the four core clinical domains of interest (e.g. social-communication symptoms, restricted/repetitive behaviors, externalizing symptoms, internalizing/anxiety symptoms). Because these analyses are a subset of the primary analyses, using the same data, further inferential statistical tests were omitted; instead, EMMs and SEs for each of the four main YTP symptom types were estimated to assess relative efficacy of the two treatments for different types of caregiver-defined goals (see Table 4).

Investigating differential treatment effects of BIACA and CC on the symptom reduction of rigid and repetitive behaviors, Site 3 showed particularly pronounced symptom reduction of rigid and repetitive behavior YTPs in BIACA (*EMM*=3.37, *SE*=.95) as compared to CC (*EMM*=5.94, *SE*=.61). At the end of treatment, Site 2 also showed a pronounced symptom reduction of internalizing/anxiety YTPs in BIACA (*EMM*=3.58, *SE*=.40) as compared to CC (*EMM*=4.95, *SE*=.42). Further, Site 2 also displayed noticeable symptom reduction of social-communication symptom YTPs in BIACA (*EMM*=4.66, *SE*=.54) as compared to CC (*EMM*=5.65, *SE*=.52). Finally, in exploring differential treatment effects of BIACA and CC on the symptom reduction of externalizing symptom YTPs, these differences across sites were slight. However, Site 1 showed noticeable decreases in symptom severity of externalizing symptom YTPs in BIACA (*EMM*=4.60, *SE*=.38) as compared to CC (*EMM*=5.21, *SE*=.39).

Discussion

The present study categorized the various caregiver-defined goals parents have for their child's treatment. Upon considering different types of caregiver-defined goals, this study assessed the relative efficacy of an adapted variant and a standard-of-practice variant of cognitive behavioral therapy (e.g., BIACA or CC) on reducing caregiver-defined areas of autism

and of interfering anxiety symptomatology using the Youth Top Problems rating scale (YTP; Weisz et al., 2011) of parent-reported problems. By employing descriptive analysis and linear mixed modelling, this study examined the extent to which caregiver-defined challenges responded to adapted and standard-of-practice CBT in order to better address personalized treatment needs and goals of school-aged children with ASD and maladaptive, interfering anxiety.

In categorizing the caregiver-defined YTPs into 43 specific symptom types (i.e. YTP Symptom Coding System; see Wood et al., *under review*), symptoms were reflective of the four core clinical areas of intervention interest for children with ASD and maladaptive and interfering anxiety (e.g., social-communication symptoms, restricted/repetitive behavior symptoms, externalizing symptoms, and internalizing/anxiety symptoms). However, the heterogeneity of problems and goals parents hoped to prioritize in treatment were vast, with most children's YTPs mapping into different clinical domains. Further, the greatest frequency of caregiver-defined goals fell into the externalizing symptom category, showcasing that even when a family is participating in a treatment specifically characterized as "anxiety focused," families may present alternative treatment priorities. There was a significant difference in treatment outcome trajectories for YTP symptom severity ratings, with the modular format of BIACA significantly outperforming the prescriptive format of CC. Further, there was a greater symptom reduction of rigid and repetitive behaviors, internalizing symptoms, social-communication symptoms, and externalizing symptoms at the end of treatment (e.g., Session 16) in BIACA than in CC with particularly pronounced symptom reduction occurring at varying sites. Thus, this study showed that an individualized intervention like BIACA better addressed personalized, caregiver-defined goals over the course of treatment.

Results from this secondary data analysis of a multisite randomized clinical trial (Wood et al., 2019) provide additional evidence and suggest that CBT is an efficacious treatment for school-aged children with ASD and maladaptive and interfering anxiety, with an adapted CBT approach exhibiting additional advantages on both nomothetic, standardized outcome measure as well as idiographic, personalized outcome measures. By matching evidence-based therapeutic techniques directly to a child's clinical needs, the modular/personalized approach of BIACA (e.g., adapted CBT) better addressed caregiver's personalized goals. Further, through utilizing the YTP rating scale (Weisz et al., 2011) as an outcome measure, the additional symptoms and varying emotional and behavioral challenge parents see as priorities for treatment were captured.

The frequency of caregiver-defined YTPs beyond internalizing/anxiety symptoms including externalizing, social-communication, and rigid and repetitive behaviors symptoms, coupled with the capacity of BIACA to effectively address these symptoms is important. The increased presence of anxiety symptomatology can provide additional challenges and distress for school-aged children with ASD (White et al., 2014; Bellini, 2004; Chang et al., 2012). Although anxiety is distinguishable from core ASD symptoms, anxiety is also influenced by core ASD symptoms (Kerns & Kendall, 2012; Kerns et al., 2017). Moreover, due to the heterogeneous nature of ASD, there is much variability in ASD and anxiety symptom presentation (Keen, Webster & Ridley, 2016) which is seen in the various caregiver-defined YTPs. Utilizing BIACA, or an adapted CBT treatment approach, to improve both externalizing symptoms and rigid and repetitive symptoms may be a route to reducing anxiety symptoms. Focusing only on anxiety reduction may not promote the greatest change in overall functioning for children with ASD. Rather, a treatment approach which prioritizes treating a range of symptoms may better address treatment needs and goals of school-aged children with ASD and anxiety.

Despite results of this study providing additional evidence supporting the efficacy of adapted CBT in reducing core ASD and interfering anxiety symptoms for school-aged children with ASD and anxiety, there are potential limitations of these findings. The sample was a convenience sample and fairly homogenous with the majority of participants being male, even though this is consistent with typical ASD gender ratios. Further, this was a somewhat diverse sample in terms of race/ethnicity, particularly at Site 1, but less so at Site 2 and Site 3.

Moreover, caregiver-defined goals were from the parent's perspective, and the children were not asked their self-defined goals as a guide in treatment for this study. Within the structure of the YTP interview utilizing at screening for this study, a parent/caregiver can identify multiple possible codes within a single YTP. This is a great benefit of the idiographic nature of the YTP because it can paint a more complete picture of the child and what the parent hopes to see as the focus of treatment instead of the one-size-fits-all approach. However, in terms of the treatment planning process, clinicians could prioritize different treatment modules as a result of how the YTPs are both categorized and interpreted. Further, parent expectations for their child may actually define their caregiver-defined goals for their child's treatment instead of the child's top problems as the YTP is intended to be used. Future adaptations to the YTP interview outlining the specific clinical areas and providing a stricter problem list to regulate treatment may mitigate these concerns in the treatment planning process. Furthermore, employing the YTP as an outcome measure coupled with traditional nomothetic measures may also paint a more complete picture of each heterogeneous child with ASD and maladaptive, interfering anxiety.

Ideally the use of efficacious interventions guided by personalized goals for treatment can transfer beyond the clinical setting. Future research should attempt to implement these interventions in a community-based or school-based context: the most likely setting of where

children will need to use their newly learned skills to manage anxiety and ASD symptoms. Efficacious and personalized interventions can promote improvements for school-aged children with ASD and interfering anxiety in school-based contexts, ideally leading to a better overall academic and social experience and increased prospect of inclusion from peers. Modular-based adapted CBT efficaciously addresses change over time on caregiver-defined goals related to emotional and behavioral challenges including, but also going beyond, anxiety symptoms. Thus, implementation research around adapted CBT in a school-based setting could be beneficial.

Table 1

Demographic and Clinical Characteristics for Adapted CBT (e.g., BIACA) and Standard-of Practice CBT (e.g., CC) Groups[1]

Characteristics	Adapted CBT (BIACA) *n* %	Standard-of Practice CBT (CC) *n* %
Child's gender (female)[2]	21/75 (28.0%)	13/72 (18.1%)
Child's ethnic[3] background		
Latino/a/x	12/75 (16.0%)	15/71 (21.1%)
Child's racial[3] background		
African American/African	7/75 (9.3%)	2/71 (2.8%)
Asian/Pacific Islander	6/75 (8.0%)	3/71 (4.2%)
White	46/75 (61.3%)	48/71 (67.6%)
Native American or Alaskan	2/75 (2.7%)	1/71 (1.4%)
Multiracial	2/75 (2.7%)	2/71 (2.8%)
African American and white	0/75 (0.0%)	2/71 (2.8%)
Asian and white	1/75 (1.4%)	0/71 (0%)
Unspecified	1/75 (1.4%)	0/71 (0%)
Total household income < $40,000	15/72 (20.8%)	13/71 (18.3%)
Father's education		
High school degree or less	14/72 (19.4%)	12/69 (17.4%)
4-year college degree or more	40/72 (55.6%)	40/69 (58.0%)
Mother's education		
High school degree or less	6/74 (8.1%)	5/70 (7.1%)
4-year college degree or more	47/72 (65.3%)	40/69 (58.0%)
Parents currently married	58/75 (77.3%)	52/71 (73.2%)
ADOS-2 Algorithm Total Score	*M*=12.9, *SD*= 3.9	*M*=13.0, *SD*= 4.1
CARS Total Score	*M*= 34.6, *SD*= 4.6	*M*= 35.6, *SD*= 4.9
WISC-IV Estimated IQ	*M*= 102.8, *SD*= 14.6	*M*= 101.6, *SD*= 15.7

Abbreviations: BIACA= Behavioral Interventions for Anxiety in Children with Autism; CC= Coping Cat, ADOS-2= Autism Diagnostic Observation Schedule–2; CARS= Childhood Autism Rating Scale; WISC-IV= Wechsler Intelligence Scale for Children

[1] Pretreatment sample characteristics showed no significant condition differences. The sample sizes vary within groups because some demographic data was not provided by some families.

[2] At the time of study onset, options for reporting a child's gender were limited to male and female. Other gender identities were not intentionally excluded from the demographic survey. Research conducted in the future will correct this omission.

[3] Race and ethnicity were queried in the same section of the survey, leading some families to report on race *or* ethnicity but not both. Future research will more clearly separate race and ethnicity in the demographic survey.

Table 2

Frequencies of Initial YTP Symptom Severity Ratings in 43-category YTP Symptom Coding System

	Social-Communication Symptoms	*Frequency*	*%*
	Poor social skills or language deficits	13	10.2
	One-sided conversation or perseverative speech with others	9	7.0
	Poor responsiveness to other initiations	3	2.3
	Poor social initiation or greetings	15	11.7
	Failure to keep conversations going or share own experiences	13	10.2
	Limited verbalizations (e.g. initiations, responses, or to-and-fro conversation)	5	3.9
	Brings up topics inappropriate to situation	0	0.0
	Ineffective or odd expression of ideas	0	0.0
	Inconsiderate or non-empathic behavior	9	7.0
	Poor nonverbal communication skills	2	1.6
	Incongruent facial/vocal affect	0	0.0
	Poor awareness of physical space with others	2	1.6
	Poor understanding of others' meaning (e.g. humor, intentions)	7	5.5
	Disengagement from others (e.g. isolation)	6	4.7
	Lack of friends including being excluded	17	13.3
	Unusual speech quality (e.g. volume, pitch)	1	0.8
	No or poor imaginative play	0	0.0
	Bad sport, failure to follow rules, act graciously to others, allow rule modifications	0	0.0
	Problems working in a group	5	3.9
	Lack of flexibility regarding peer socialization (e.g. around non-preferred activities, bossiness, can be with anger)	21	16.4
Total		128	100.0

	Restricted/Repetitive Behavior Symptoms		
	Restricted Interests	7	6.0
	Perseveration in behavior or thoughts	11	9.4
	Inflexibility – nonsocial (e.g. resists non-preferred activities, daily routines, expectations, transitions, new things, can be shown with anger and negative affect)	78	66.7
	Rituals	8	6.8
	Motoric self-stimulation (e.g. flapping)	4	3.4
	Habits (e.g. picking)	4	3.4
	Sensitivity to noise and big crowds	5	4.3
Total		117	100.0
	Externalizing Symptoms		
	Impulsive, often silly	2	1.1
	Impulsive touching of others	1	0.5
	Inattentive, distracted, or off-task	20	10.6
	Non-compliance and often with anger	50	26.5
	Easily angered or frustrated (e.g. with family, difficult tasks, blocked goals, sense of unfairness)	78	41.3
	Easily angered or frustrated with physical aggression	6	3.2
	Acts young for age	1	0.5
	Self-injury or self-aggression (including negative self-esteem)	23	12.2
	Rule violations in communication (e.g. non-illegal)	3	1.6
	Truancy	0	0.0
	Stealing	2	1.1
	Lack of taking responsibility for own actions, blaming, tattling	3	1.6
Total		189	100.0
	Internalizing Symptoms		
	Non-social, general anxiety (e.g. germs, math, worry, movies, new places, making decisions)	94	50.5

	Shyness or social anxiety (e.g. meeting new people or kids in general, joining games, fear of embarrassment or mistakes in front of others)	42	22.6
	Separation anxiety including clinging to adults	43	23.1
	Depressive behaviors and feelings	7	3.8
Total		186	100.0

Figure 1

Frequencies of Initial YTP Symptom Severity Ratings Grouped by Clinical Domain

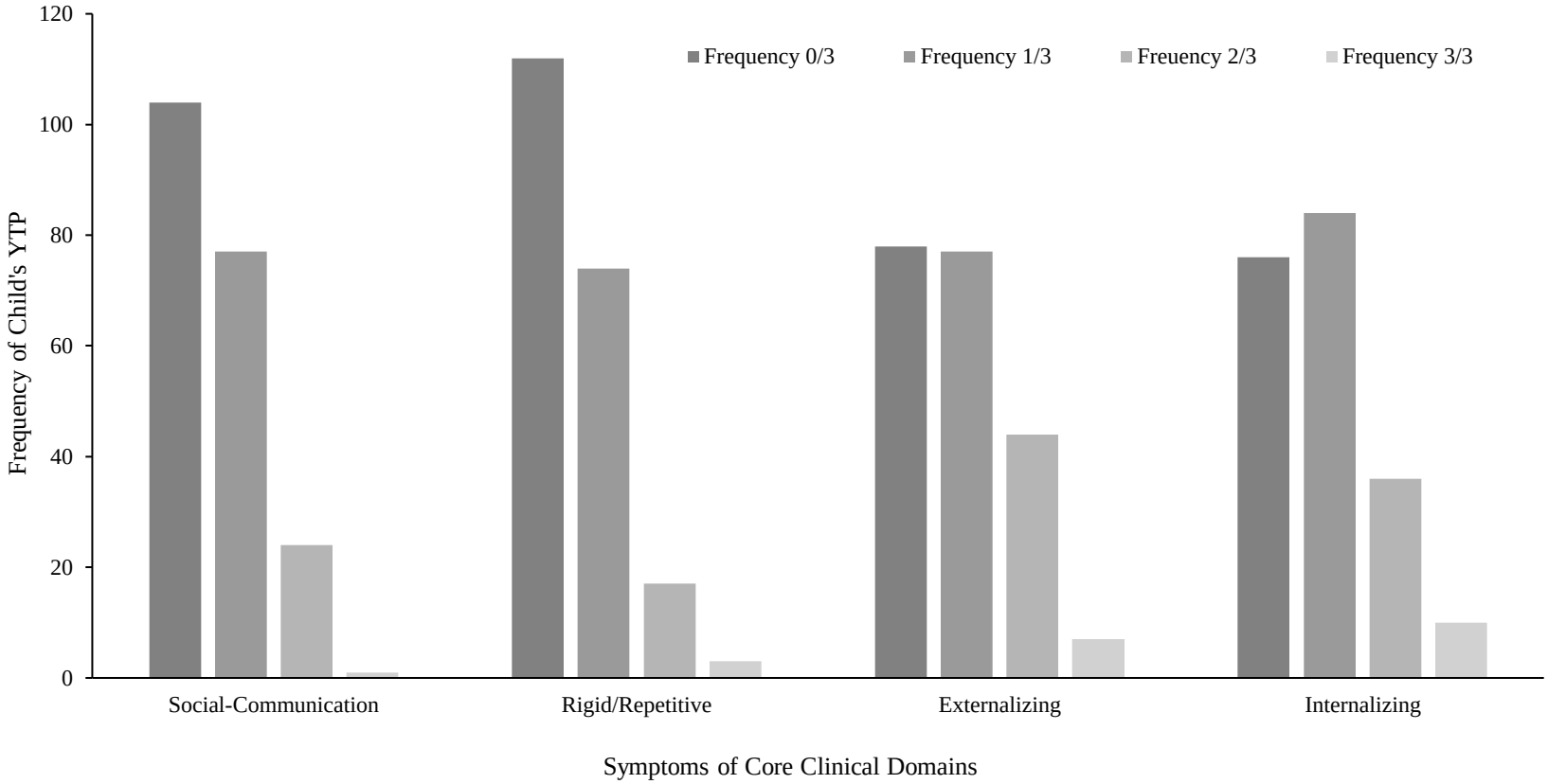


Figure 2

Frequency of Initial YTP Symptom Severity Ratings across Clinical Domains

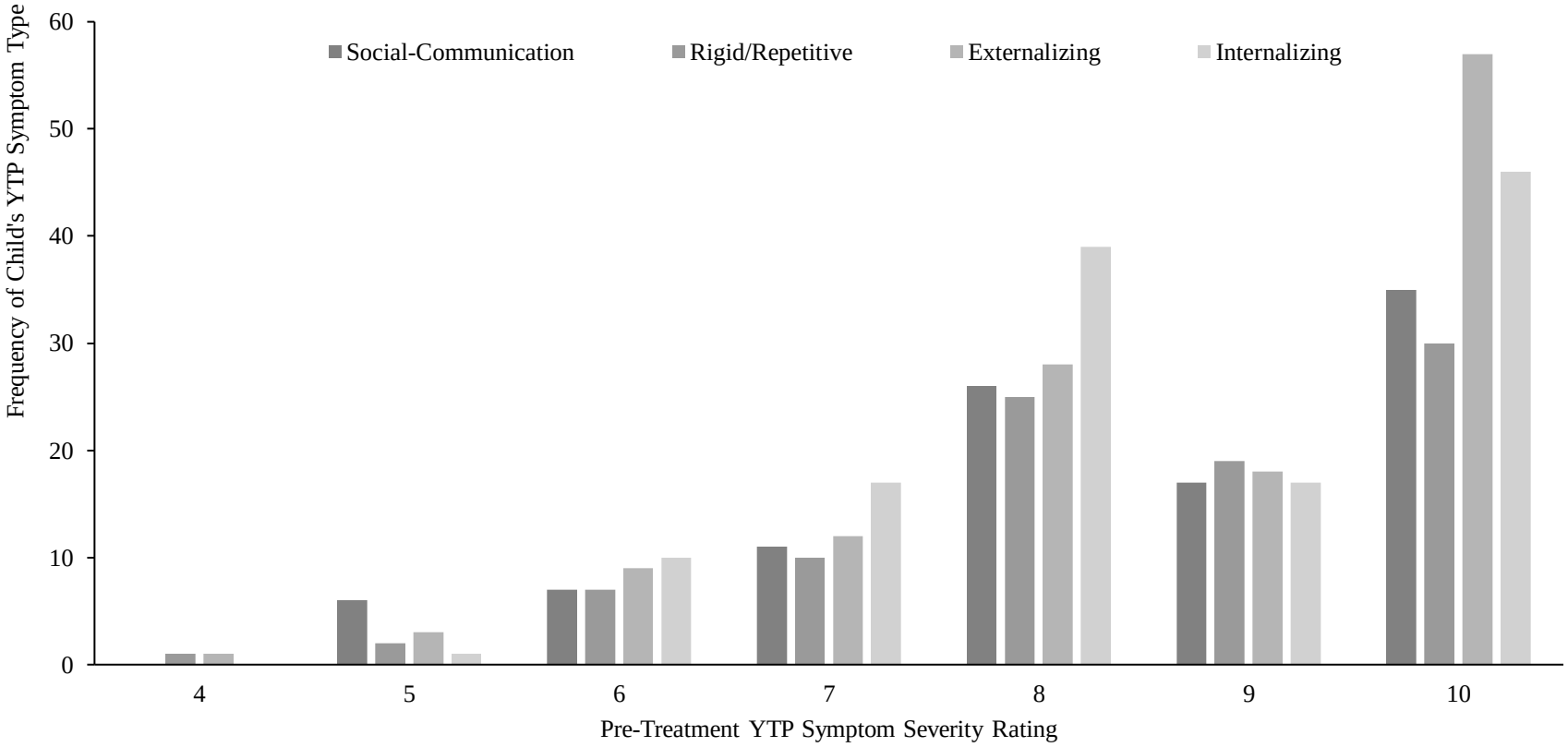


Table 3

LMM Estimated Model Dimensions for Effect of Adapted CBT (e.g., BIACA) Versus Standard-of-Practice CBT (e.g., CC) on Mean Weekly YTP Ratings During Treatment for 16-Weeks of Treatment

YTP Scores				
Fixed Effect	Numerator *df*	Denominator *df*	*F*-ratio	*p*-value
For Intercept				
Intercept	1	178.63	2863.80	<.001
Treatment Condition	1	178.63	0.69	.406
Site	2	178.65	1.57	.210
For Session Number slope				
Intercept	1	1966.94	1020.44	<.001
Treatment Condition by Session	1	1966.94	3.86	.049
Treatment Condition by Site	2	178.65	0.57	.567
Site by Session	2	1966.43	4.52	.011
Treatment Condition by Session by Site	2	1966.43	2.89	.056

Note. LMM= Linear Mixed Models. YTP= Youth Top Problems scale. BIACA= Behavioral Interventions for Anxiety in Children with Autism. CC= Coping Cat. CBT= Cognitive Behavioral Therapy. LMM for YTP scores uses a normal distribution. The YTP model is based on all available weekly YTP data including participants who have less than 16 weeks of data.

Table 4

Estimated Marginal Mean (EMMs) of Weekly YTP Ratings During Treatment for Adapted CBT (e.g., BIACA) Versus Standard-of-Practice CBT (e.g., CC) for Predicted Mean YTP Severity Ratings and Clinical Domains and by Site

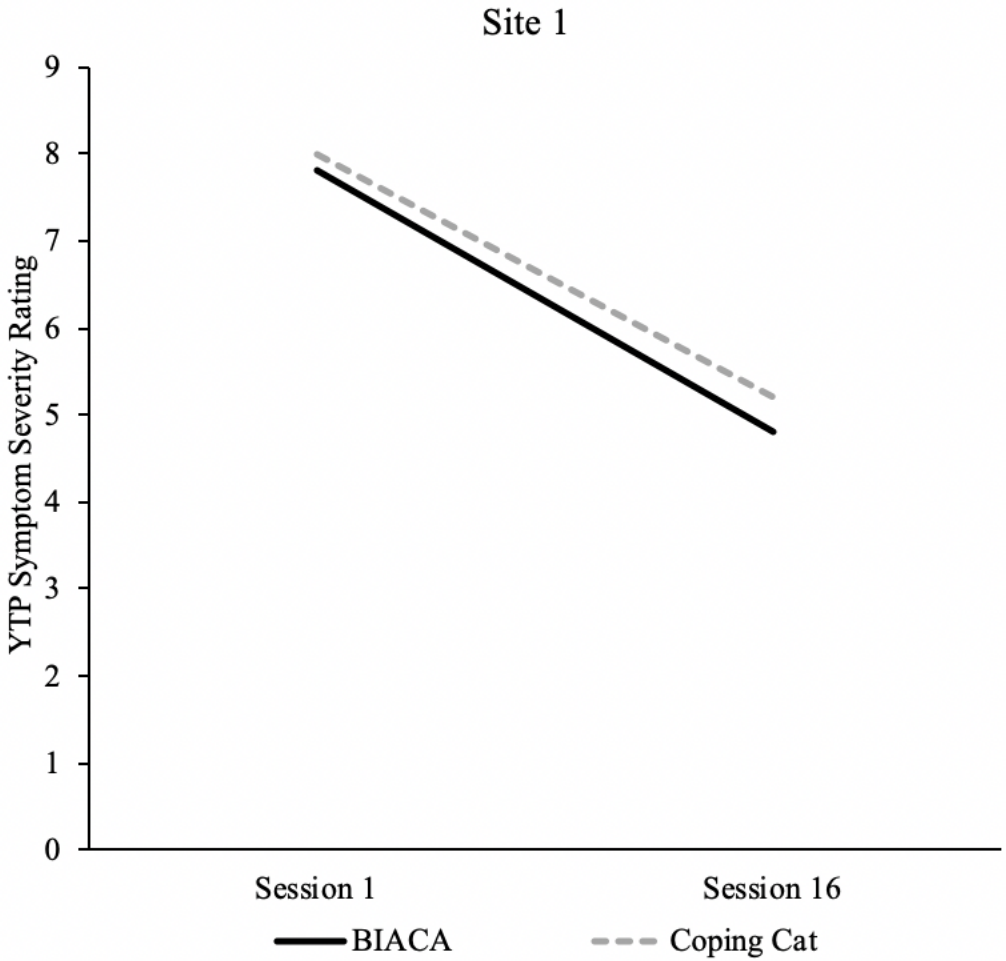
YTP Clinical Domain		Estimated Marginal Means (*SE*s)			
		Adapted CBT (BIACA) Session 1	Adapted CBT (BIACA) Session 16	Standard-of-Practice CBT (CC) Session 1	Standard-of-Practice CBT (CC) Session 16
Predicted Mean YTP Total	Site 1	7.82 (.30)	4.86 (.31)	7.90 (.33)	5.18 (.34)
	Site 2	7.66 (.30)	4.34 (.30)	7.67 (.33)	5.21 (.34)
	Site 3	6.89 (.44)	4.66 (.44)	7.60 (.39)	5.25 (.40)
Social-Communication Symptoms	Site 1	7.77 (.46)	4.95 (.47)	7.82 (.51)	5.45 (.52)
	Site 2	7.36 (.53)	4.66 (.54)	7.23 (.51)	5.65 (.52)
	Site 3	6.18 (.72)	4.58 (.72)	7.44 (.68)	5.16 (.69)
Rigid & Repetitive Behavior Symptoms	Site 1	8.06 (.63)	5.97 (.64)	7.92 (.60)	4.88 (.61)
	Site 2	6.73 (.50)	4.34 (.50)	8.31 (.58)	4.95 (.59)
	Site 3	6.72 (.89)	3.37 (.95)	7.56 (.60)	5.94 (.61)
Externalizing Symptoms	Site 1	7.72 (.38)	4.60 (.38)	8.06 (.38)	5.21 (.39)
	Site 2	7.39 (.52)	5.70 (.52)	6.77 (.45)	5.29 (.45)
	Site 3	7.14 (.60)	4.77 (.62)	7.74 (.54)	5.41 (.56)
Internalizing Symptoms	Site 1	7.66 (.40)	4.39 (.41)	7.95 (.54)	5.37 (.55)

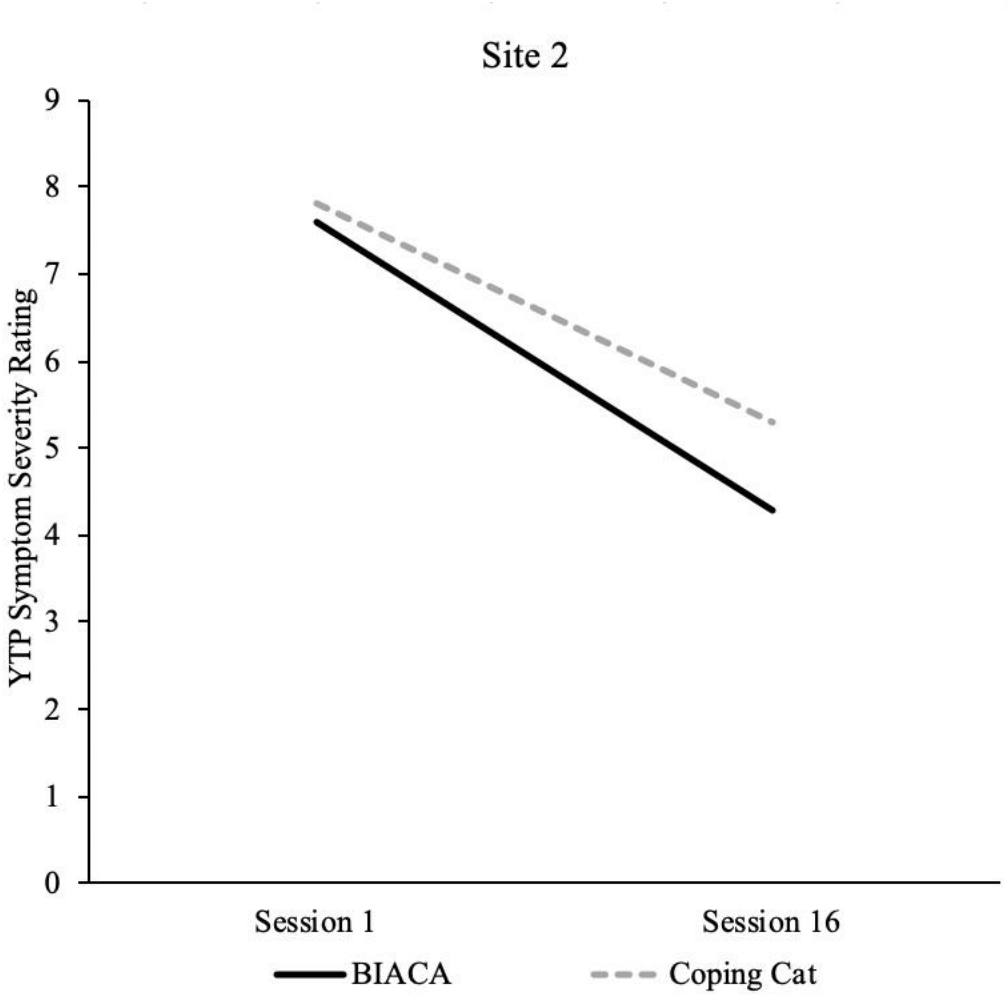
	Site 2	7.65 (40)	3.58 (.40)	8.26 (.41)	4.95 (.42)
	Site 3	7.39 (.53)	4.95 (.54)	7.54 (.51)	5.04 (.53)

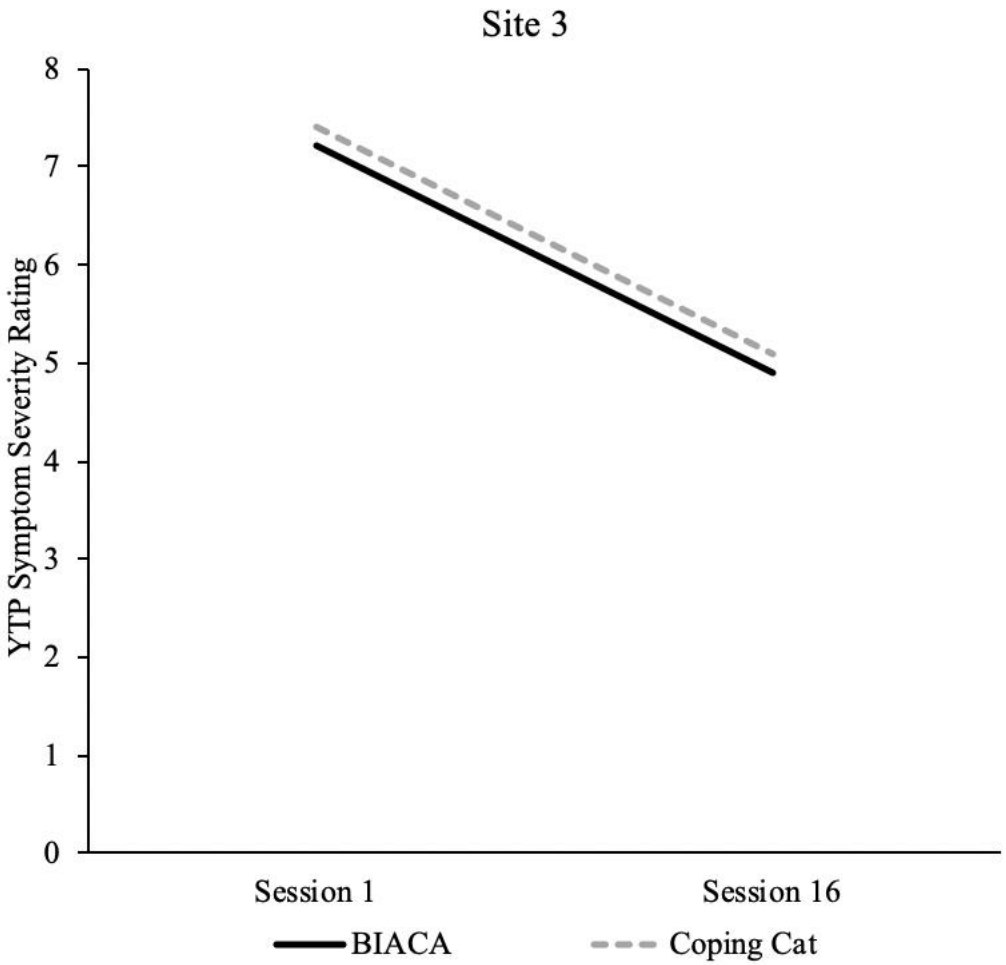
Note. YTP= Youth Top Problems scale. BIACA= Behavioral Interventions for Anxiety in Children with Autism. CC= Coping Cat. CBT= Cognitive Behavioral Therapy.

Figure 3

Change in Estimated Marginal Means (EMMs) of Predicted Mean Weekly YTP Ratings During Treatment for Adapted CBT (e.g., BIACA) and Standard-of-Practice CBT (e.g., CC) from Session 1 to Session 16, across all three sites. Abbreviations: BIACA= Behavioral Interventions for Anxiety in Children with Autism. CC= Coping Cat. CBT=cognitive behavioral therapy. YTP=Youth Top Problems scale.




Site 2
YTP Symptom Severity Rating
9
8
7
6
5
4
3
2
1
0
Session 1
Session 16
BIACA
Coping Cat


Site 3
YTP Symptom Severity Rating
8
7
6
5
4
3
2
1
0
Session 1
Session 16
BIACA
Coping Cat

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). doi: 10.1176/appi.books.9780890425596

Baio, J., Wiggins, L., Christensen, D. L., Maenner, M. J., Daniels, J., Warren, Z., … & Dowling, N. F. (2018). Prevalence of autism spectrum disorder among children aged 8 years - Autism and developmental disabilities monitoring network, 11 sites, United States, 2014. *Morbidity and Mortality Weekly Report. Surveillance summaries (Washington, D.C.: 2002)*, *67*(6), 1–23. doi:10.15585/mmwr.ss6706a1

Baker, M. J., Koegel, R. L., & Koegel, L .K. (1998). Increasing the social behavior of young children with autism using their obsessive behaviors. *Journal of the Association for Persons with Severe Handicaps*, *23*, 300–308.

Bauminger-Zviely, N. (2014). School-age children with ASD: Chapter 6. In *Handbook of Autism and Pervasive Developmental Disorders, Fourth Edition* (eds F. R. Volkmar, R. Paul, S. J. Rogers and K. A. Pelphrey). doi:10.1002/9781118911389.hautc06

Bellini, S. (2004). Social skill deficits and anxiety in high-functioning adolescents with autism spectrum disorder. *Focus on Autism and Other Developmental Disabilities*, *19*, 78–86. doi:10.1177/10883576040190020201

Brewin, C. R. (2006). Understanding cognitive behaviour therapy: A retrieval competition account. *Behaviour Research and Therapy*, *44*(6), 765-784.

Cartwright-Hatton, S., Roberts, C., Chitsabesan, P., Fothergill, C., & Harrington, R. (2004). Systematic review of the efficacy of cognitive behaviour therapies for childhood and adolescent anxiety disorders. *British Journal of Clinical Psychology*, *43*(4), 421-436.

Centers for Disease Control and Prevention. (2018). Prevalence of autism spectrum disorders: Autism and developmental disabilities monitoring network. *Mortality Morbidity Weekly Report Surveillance Summaries, 65*, 1–28.

Chalfant, A. M., Rapee, R., & Caroll, L. (2007). Treating anxiety disorders in children with high functioning autism spectrum disorders: A controlled trial. *Journal of Autism and Developmental Disorders*, *37*, 1842–1857. doi: 10.1007/s10803-006-0318-4

Chang, Y., Quan, J. & Wood, J.J. (2012). Effects of anxiety disorder severity on social functioning in children with autism spectrum disorders. *Journal of Developmental and Physical Disabilities, 24* (3), 235-245. doi:10.1007/s10882-012-9268-2

Cuccaro, M. L., Shao, Y., Grubber, J., Slifer, M., Wolpert, C. M., Donnelly, S. L., ... & Pericak-Vance, M. A. (2003). Factor analysis of restricted and repetitive behaviors in autism using the Autism Diagnostic Interview-R. *Child Psychiatry and Human Development*, *34*(1), 3-17.

Fleiss, J. L. (1981). Statistical methods for rates and proportions (2nd ed.). New York: John Wiley. ISBN 978-0-471-26370-8

Hunsche, M. C., & Kerns, C. M. (2019). Update on the effectiveness of psychotherapy for anxiety disorders in children and adolescents with ASD. *Bulletin of the Menninger Clinic, 83*(3), 326–352. doi:10.1521/bumc.2019.83.3.326

Kaat, A. J., Gadow, K. D. & Lecavalier, L. (2013) Psychiatric symptom impairment in children with autism spectrum disorders. *Journal of Abnormal Child Psychology. 41*. 959–969. doi:10.1007/s10802-013-9739-7

Kanne, S. M., Mazurek, M. O., Sikora, D., Bellando, J., Branum-Martin, L., Handen, B., ... & Warren, Z. (2014). The Autism Impact Measure (AIM): initial development of a new tool for treatment outcome measurement. *Journal of Autism and Developmental Disorders, 44*(1), 168-179.

Kanner, L., (1943). Autistic disturbances of affective contact. *Pathology*. 217-250.

Keen, D., Webster, A., & Ridley, G. (2016). How well are children with autism spectrum disorder doing academically at school? An overview of the literature. *Autism. 20*(3), 276-294. doi:10.1177/1362361315580962

Kendall, P. C., & Hedtke, K. A. (2006). *Cognitive-behavioral therapy for anxious children: Therapist manual*. Workbook Publishing.

Kendall, P. C., & Southam-Gerow, M. A. (1996). Long-term follow-up of a cognitive-behavioral therapy for anxiety-disordered youth. *Journal of Consulting and Clinical Psychology, 64*(4), 724–730.

Kendall, P. C., Flannery-Schroeder, E., Panichelli-Mindel, S. M., Southam-Gerow, M., Henin, A., & Warman, M. (1997). Therapy for youths with anxiety disorders: A second randomized clincal trial. *Journal of Consulting and Clinical Psychology, 65*(3), 366.

Kendall, P. C., Hudson, J. L., Gosch, E., Flannery-Schroeder, E., & Suveg, C. (2008). Cognitive-behavioral therapy for anxiety disordered youth: a randomized clinical trial evaluating child and family modalities. *Journal of Consulting and Clinical Psychology*, *76*(2), 282.

Kerns, C. M., Kendall, P. C. (2012). The presentation and classification of anxiety in autism spectrum disorder. *Clinical Psychology: Science and Practice. 19*(4). 323-347. doi:10.1111/cpsp.12009

Kerns, C. M., Kendall, P. C., Berry, L., Souders, M. C., Franklin, M. E., Schultz, R. T., ... & Herrington, J. (2014). Traditional and atypical presentations of anxiety in youth with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *44*(11), 2851-2861.

Kerns, C., Renno, P., Storch, E., Kendall, P., & Wood, J. J. (2017). *Anxiety in children and adolescents with autism spectrum disorder: Evidence-based assessment and treatment*. Chapter 1: Introduction. 1-4. doi:10.1016/B978-0-12-805122-1.00001-6

Matson, J. L., & Nebel-Schwalm, M. (2007). Assessing challenging behaviors in children with autism spectrum disorders: A review. *Research in Developmental Disabilities*, *28*(6), 567-579.

McNally-Keehn, R. H., Lincoln, A. J., Brown, M. Z., & Chavira, D. A., (2013). The coping cat program for children with anxiety and autism spectrum disorder: A pilot randomized controlled trial. *Journal of Autism and Developmental Disorders, 43,* 57–67.

Mertens, D. M. (2019). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods*. Sage publications.

Puleo, C. M., & Kendall, P. C. (2011). Anxiety disorders in typically developing youth: autism spectrum symptoms as a predictor of cognitive-behavioral treatment. *Journal of Autism and Developmental Disorders*, *41*(3), 275-286.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (Vol. 1). Sage.

Reaven, J., Blakeley-Smith, A., Culhane-Shelburne, K., & Hepburn, S. (2012) Group cognitive behavior therapy for children with high-functioning autism spectrum disorders and anxiety: a randomized trial. *Journal of Child Psychology and Psychiatry*. *53*(4), 410-419. doi:10.1111/j.1469-7610.2011.02486.x

Samson, A. C., Phillips, J. M., Parker, K. J., Shah, S., Gross, J. J., & Hardan, A. Y. (2014). Emotion dysregulation and the core features of autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *44*(7), 1766-1772.

Storch, E. A., Larson, M. J., Ehrenreich-May, J., Arnold, E. B., Jones, A. M., Renno, P., ... & Wood, J. J. (2012). Peer victimization in youth with autism spectrum disorders and co-occurring anxiety: relations with psychopathology and loneliness. *Journal of Developmental and Physical Disabilities*, *24*(6), 575-590.

Storch, E. A., Arnold, E. B., Lewin, A. B., Nadeau, J. M., Jones, A. M., De Nadai, A. S., ... & Murphy, T. K. (2013). The effect of cognitive-behavioral therapy versus treatment as usual for anxiety in children with autism spectrum disorders: A randomized, controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry*, *52*(2), 132-142. doi:10.1016/j.jaac.2012.11.007

Storch, E. A., Lewin, A. B., Collier, A. B., Arnold, E., De Nadai, A. S., Dane, B. F., ... & Murphy, T. K. (2015). A randomized controlled trial of cognitive-behavioral therapy versus treatment as usual for adolescents with autism spectrum disorders and comorbid anxiety. *Depression and Anxiety*, *32*(3), 174-181. doi:10.1002/da.22332

Stuart, E. A., McGinty, E. E., Kalb, L., Huskamp, H. A., Busch, S. H., Gibson, T. B., ... & Barry, C. L. (2017). Increased service use among children with autism spectrum disorder associated with mental health parity law. *Health Affairs*, *36*(2), 337-345. doi:10.1377/hlthaff.2016.0824

Swan, A. J., & Kendall, P. C. (2016). Fear and missing out: Youth anxiety and functional outcomes. *Clinical Psychology: Science and Practice*, *23*(4), 417-435.

Swan, A. J., Kendall, P. C., Olino, T., Ginsburg, G., Keeton, C., Compton, S., ... & Albano, A. M. (2018). Results from the child/adolescent anxiety multimodal longitudinal study (CAMELS): Functional outcomes. *Journal of Consulting and Clinical Psychology*, *86*(9), 738.

Van Steensel, F. J., Bogels, S. M., & Perrin, S., (2011). Anxiety disorders in children and adolescents with autistic spectrum disorders: a meta-analysis. *Clinical Child and Family Psychology Review*, *14*, 302-317. doi:10.1007/s10567-011-0097-0

Van Steensel, F. J, & Bögels, S. M. (2015). CBT for anxiety disorders in children with and without autism spectrum disorders. *Journal of Consulting and Clinical Psychology*, *83*(3), 512.

Weisz, J. R., Chorpita, B. F., Frye, A., Ng, M. Y., Lau, N., Bearman, S. K., ... & Hoagwood, K. (2011). Youth top problems: Using idiographic, consumer-guided assessment to identify treatment needs and to track change during psychotherapy. *Journal of Consulting and Clinical Psychology*, *79*(3), 369.

Weisz, J. R., Chorpita, B. F., Palinkas, L. A., Schoenwald, S. K., Miranda, J., Bearman, S. K., ... & Gray, J. (2012). Testing standard and modular designs for psychotherapy treating

depression, anxiety, and conduct problems in youth: A randomized effectiveness trial. *Archives of General Psychiatry, 69*(3), 274-282.

White, S. W., Mazefsky, C. A., Dichter, G. S., Chiu, P. H., Richey, J. A., & Ollendick, T. H. (2014). Social-cognitive, physiological, and neural mechanisms underlying emotion regulation impairments: understanding anxiety in autism spectrum disorder. *International Journal of Developmental Neuroscience*. *39*. 29-36.

Wood, J. J., Drahota, A., Sze, K., Har, K., Chiu, A., & Langer, D. A. (2009). Cognitive behavioral therapy for anxiety in children with autism spectrum disorders: a randomized, controlled trial. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *50*(3), 224–234. doi:10.1111/j.1469-7610.2008.01948.x

Wood, J. J. & Gadow, K. D. (2010). Exploring the nature and function of anxiety in youth with autism spectrum disorders. *Clinical Psychology: Science and Practice*, *17*, 281-292. doi:10.1111/j.1468-2850.2010.01220.x

Wood, J. J., Ehrenreich-May, J., Alessandri, M., Fujii, C., Renno, P., Laugeson, E., ... & Murphy, T. K. (2015). Cognitive behavioral therapy for early adolescents with autism spectrum disorders and clinical anxiety: A randomized, controlled trial. *Behavior Therapy*, *46*(1), 7-19. doi:10.1016/j.beth.2014.01.002

Wood, J. J., Kendall, P. C., Wood, K. S., Kerns, C. M., Seltzer, M., Small, B. J., ... & Storch, E. A. (2019). Cognitive behavioral treatments for anxiety in children with autism spectrum disorder: A randomized clinical trial. *JAMA Psychiatry*. *77*(5), 1-10. doi:10.1001/jamapsychiatry.2019.4160

Zablotsky, B., Pringle, B. A., Colpe, L. J., Kogan, M. D., Rice, C., & Blumberg, S. J. (2015). Service and treatment use among children diagnosed with autism spectrum disorders. *Journal of Developmental and Behavioral Pediatrics: JDBP*, *36*(2), 98.